

Notice of Allowability

Application No.

10/668,503

Examiner

James M Hewitt

Applicant(s)

ERNST ET AL.

Art Unit

3679

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to communications filed 5/11/05 and 6/11/05.
2. ☒ The allowed claim(s) is/are 21-34 which will appear as 1-14 respectively in the patent.
3. ☒ The drawings filed on 9/24/03 w/replacement sheet of 5/11/05 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 06152005.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


JAMES M. HEWITT
PRIMARY EXAMINER

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Warren Olsen on 6/15/05.

The application has been amended as follows:

On page 1 of the specification, the phrase --now U.S. Patent No. 6,764,108,-- has been inserted between "2002," and "which".

The following set of claims replaces all previous versions of the claims:

--21. An elongated drive string assembly comprising a plurality of hollow sucker rods and connecting elements with an axis, connected together and between a drive head located at the surface of an oil well and a rotary pump located deep down the oil well, wherein at least one hollow sucker rod has a first end comprising an internal female threaded surface engaging an external male threaded surface on at least one connecting element, wherein said threads are frusto-conical and non-symmetrical, but differential in diametral taper to each other; the first end of said at least one hollow sucker rod further comprising an annular torque shoulder that is engaging an annular torque shoulder on said at least one connecting element and being characterized in

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that, for an outside diameter of the connecting element (DEN), an internal diameter (DIN) of the connecting element, and a starting diameter of the torque shoulder on the connecting element (DHT), the following ratios are maintained:

Diameter Ratios	Range	
	Min.	Max.
DHT/DEN	0.60	0.98
DIN/DEN	0.15	0.90
DIN/DHT	0.25	0.92

wherein said at least one connector element is a separate nipple having said male threaded surface on at least one free end of that nipple and a central section defining said engaging torque shoulder, and said male threaded surface of said nipple free end comprising complete threads, said nipple free end further comprises a portion that is adapted to engage against an inner surface of the rod, so as to define a seal between an inner bore of the hollow rod and the complete threads.

22. An elongated drive string assembly according to Claim 21, wherein both free ends of said nipple comprise a male threaded surface comprising complete threads

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and an engaging portion which comprises an external cylindrical zone between each free end and the beginning of the male threaded surface on each free end, said zones define said seal between the inner bore of the hollow rod and the complete threads on each nipple free end.

23. An elongated drive string assembly comprising a plurality of hollow sucker rods and connecting elements with an axis, connected together and between a drive head located at the surface of an oil well and a rotary pump located deep down the oil well, wherein at least one hollow sucker rod has a first end comprising an internal female threaded surface engaging an external male threaded surface on at least one connecting element, wherein said threads are frusto-conical and non-symmetrical, but differential in diametral taper to each other; the first end of said at least one hollow sucker rod further comprising an annular torque shoulder that is engaging an annular torque shoulder on said at least one connecting element and being characterized in that, for an outside diameter of the connecting element (DEN), an internal diameter (DIN) of the connecting element, and a starting diameter of the torque shoulder on the connecting element (DHT), the following ratios are maintained:

Diameter Ratios	Range	
	Min.	Max.
DHT/DEN	0.60	0.98
DIN/DEN	0.15	0.90
DIN/DHT	0.25	0.92

wherein those hollow sucker rods located proximate to each extreme end of the string have a plurality of holes extending through wall sections of those rods so as to enable fluid flowing outside of those rods to also flow within the inner bore of the drive string and between the extreme ends of said elongated drive string.

24. An elongated drive string assembly according to Claim 23, wherein the plurality of holes are drilled radially through said wall sections of those sucker rods which are proximate to each extreme end of the string.

25. An elongated drive string assembly according to Claim 23, wherein the plurality of holes are arranged in a symmetrical fashion about the centerline of the rod, in the wall sections of those sucker rods which are proximate to each extreme end of the string.

26. An elongated drive string assembly according to Claim 23, wherein the plurality of holes comprise between about 62 and 162 holes which are arranged in sets of one to three holes at specific transverse sections spaced along the centerline of the rod, in the wall sections of those sucker rods which are proximate to each extreme end of the string.

27. An elongated drive string assembly according to Claim 23, wherein the plurality of holes comprise between about 62 and 162 holes which are arranged in a helicoidal path about the centerline of the rod, in the wall sections of those sucker rods which are proximate to each extreme end of the string.

28. A connecting element adapted to engage a hollow sucker rod which includes an inner bore along an axis, wherein an external male threaded surface on the connecting element is proximate at least one free end thereof and is adapted to engage a first end of a hollow sucker rod comprising an internal female threaded surface which is complementary but differential in diametral taper to the male threaded surface, wherein the male threaded surface comprises threads which are frusto-conical and non-symmetrical; the connecting element further comprising at least one annular torque shoulder which is adapted to engage an annular torque shoulder on a hollow sucker rod first end, and being characterized in that, for an outside diameter of the connecting element (DEN), an internal diameter (DIN) of the connecting element, and a starting diameter of the torque shoulder of the connecting element (DHT), the following ratios are maintained:

Diameter Ratios	Range	
	Min.	Max.
DHT/DEN	0.60	0.98
DIN/DEN	0.15	0.90
DIN/DHT	0.25	0.92

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wherein said connecting element further comprises a central section defining said engaging torque shoulder, and the connecting element male threaded surface further comprises a portion that is adapted to engage against an inner surface of a connected hollow sucker rod, so as to define a seal between an inner bore of said connected hollow rod and the complete threads.

29. A connecting element according to Claim 28, further comprising an axial bore which is conical and opening towards each free end thereof, and the engaging portion further comprises an external cylindrical zone between at least one free end and a beginning of the male threaded surface proximate that free end which defines said seal between an inner bore of said connected hollow rod and the complete threads.

30. A hollow sucker rod adapted to engage a connecting element along an axis, wherein the hollow sucker rod comprises a wall surrounding an inner bore and has at least a first end comprising an internal female threaded surface adapted to engage an external male threaded surface of a connecting element, which is complementary but differential in diametral taper to the female threaded surface; said first end of the hollow sucker rod further comprising an annular torque shoulder adapted to engage an annular torque shoulder of a connecting element, and being characterized by an outside diameter of a connecting element (DEN), an internal diameter (DIN) of a connecting

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element, and a starting diameter of the torque shoulder of a connecting element (DHT), wherein the following ratios are maintained:

Diameter Ratios	Range	
	Min.	Max.
DHT/DEN	0.60	0.98
DIN/DEN	0.15	0.90
DIN/DHT	0.25	0.92

wherein a rod that is adapted to be located proximate to an extreme end of a drill string has a plurality of holes through a portion of the rod wall so as to enable fluid flowing outside of the rod to also flow within said inner bore.

31. A hollow rod according to Claim 30, wherein the plurality of holes are drilled radially through the rod wall.

32. A hollow rod according to Claim 30, wherein the plurality of holes through the rod wall are arranged in a symmetrical fashion about the centerline of the rod.

33. A hollow rod according to Claim 30, wherein the plurality of holes comprise between about 62 and 162 holes which are arranged in sets of one to three holes at specific transverse sections spaced along the centerline of the rod.

34. A hollow rod according to Claim 30, wherein the plurality of holes comprise between about 62 and 162 holes which are arranged in a helicoidal path about the centerline of the rod.--

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

The prior art of record does not disclose, singly or in combination, an elongated drive string assembly as claimed in detail in claims 21 and 23, a connecting element as claimed in detail in claim 28, or a hollow sucker rod as claimed in detail in claim 30.

The closest prior art includes: Pfeiffer et al (US 4,955,644), Guy (US 4,852,655), Davis (US 2,070,077), and Goodner (US 2,940,787). These references are drawn to hollow sucker rods and connecting elements therefor, yet none teach or fairly suggest the given ranges for the diameter ratios required in each of claims 21, 23, 28 and 30, and also that the threads on the sucker rod and connecting element are differential in diametral taper, especially given the unexpected results that are produced by employing such ranges for the diameter ratios with such a threaded engagement. These results are outlined in paragraphs [0005], [0006], [0009], and [0018] in the specification.

Further, regarding claim 21, the prior art fails to teach or fairly suggest the limitation "said nipple free end further comprises a portion that is adapted to engage against an inner surface of the rod, so as to define a seal between an inner bore of the hollow rod and the complete threads."

Further, regarding claim 23, the prior art fails to teach or fairly suggest the limitation "wherein those hollow sucker rods located proximate to each extreme end of the string have a plurality of holes extending through wall sections of those rods so as to enable fluid flowing outside of those rods to also flow within the inner bore of the drive string and between the extreme ends of said elongated drive string."

Further, regarding claim 28, the prior art fails to teach or fairly suggest the limitation "the connecting element male threaded surface further comprises a portion that is adapted to engage against an inner surface of a connected hollow sucker rod, so as to define a seal between an inner bore of said connected hollow rod and the complete threads."

Further, regarding claim 30, the prior art fails to teach or fairly suggest the limitation "wherein a rod that is adapted to be located proximate to an extreme end of a drill string has a plurality of holes through a portion of the rod wall so as to enable fluid flowing outside of the rod to also flow within said inner bore."

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

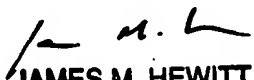
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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M Hewitt whose telephone number is 571-272-7084.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Stodola can be reached on 571-272-7087. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


JAMES M. HEWITT
PRIMARY EXAMINER